

MAGNT RESEARCH REPORT NO. 3

January 1999

A PRELIMINARY REPORT ON THE INSECTS OF ASHMORE REEF NATURE RESERVE

G R BROWN



Museums and Art Galleries of the Northern Territory

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INTRODUCTION

Ashmore Reef lies approximately 850 km west of Darwin at 12°15'S, 123°00'E and consists of three low sand islands (West I., Middle I., and East I.; Fig. 1) that are predominantly covered with grass (Fig. 2) and other low herbaceous or sprawling plants. There are few shrubs, with the exception of octopus bush, *Argusia argentea*, which forms a bordering ring (Figs 3-4) on West Island and occurs as scattered bushes on the perimeter of East and Middle Islands, and 2-3 planted coconut trees each on West and Middle Islands (Pike and Leach, 1997).

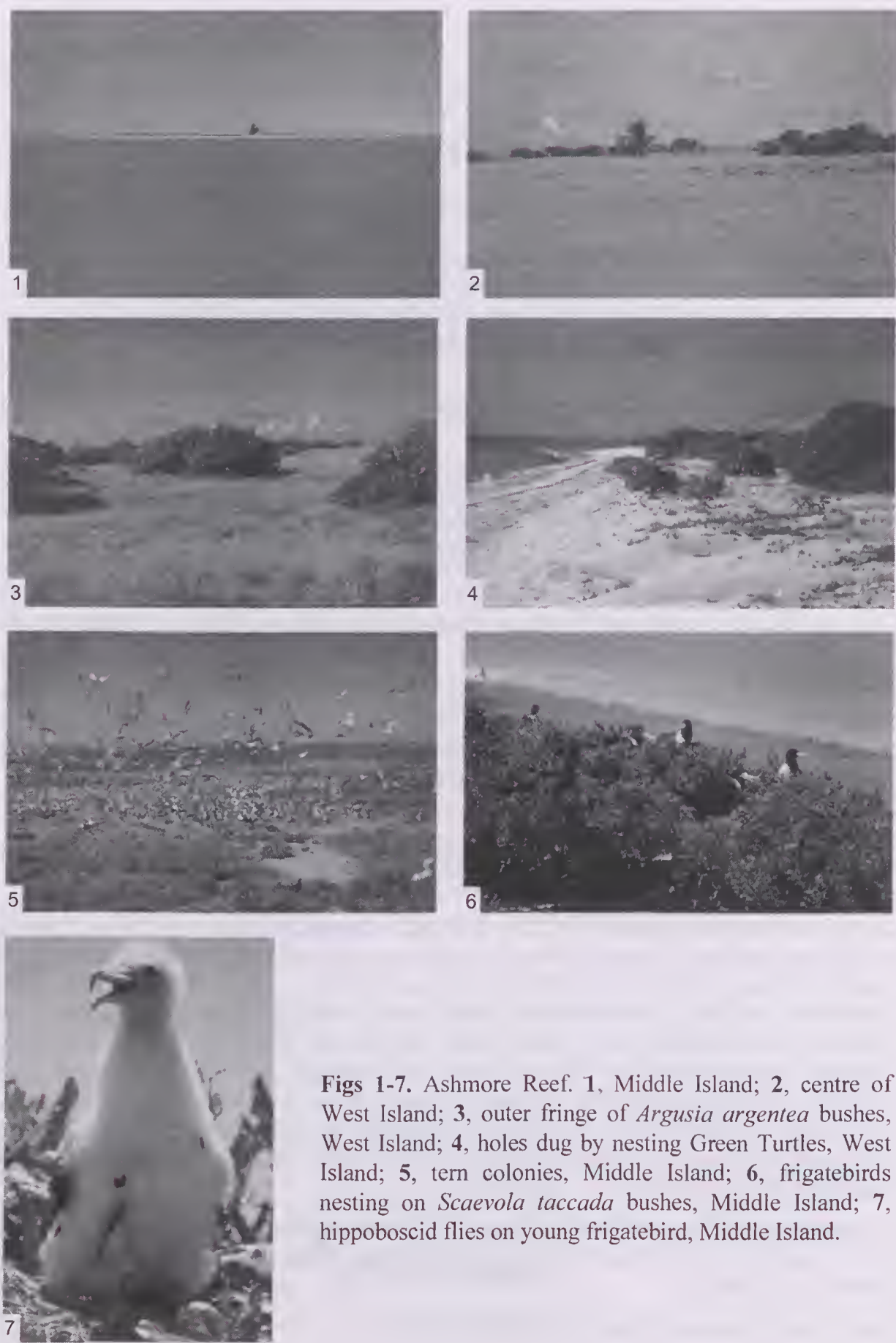
The islands are important nesting sites for both turtles (Fig. 4) and a wide variety of sea birds (Figs 5-7) including terns, noddies, frigatebirds, tropicbirds and boobies. Little is known of the insects of the Islands, although Pike (1992) made some preliminary observations on the fauna. The present report reviews the insect fauna of Ashmore Reef.

METHODS

A visit to the Islands from 8-18th May 1995 was undertaken courtesy of Parks Australia North and the Royal Australian Navy. Insects were collected using hand netting, Malaise trap, collecting at white incandescent lights and Moericke traps. Most collecting was undertaken on West Island and on the charter vessel *Aurelia IV* which was anchored in the lagoon off the southern tip of West Island. The Malaise trap was set up amongst the *Argusia argentea* bushes near the western end of West Island. Moericke traps (yellow fluid filled dishes) were placed under *Argusia* bushes on West Island near the southern end of the island. The latter were successful only in collecting hermit crabs, and their use was discontinued without collecting any insects. Collecting at lights was undertaken either at the camp site by Des Pike or on *Aurelia IV*.

In addition to collected material, reference was also made to material collected by Des Pike over a period of several years and held in the Museum and Art Gallery of the Northern Territory (MAGNT).

Insects were grouped by habitats or habits as follows



Figs 1-7. Ashmore Reef. 1, Middle Island; 2, centre of West Island; 3, outer fringe of *Argusia argentea* bushes, West Island; 4, holes dug by nesting Green Turtles, West Island; 5, tern colonies, Middle Island; 6, frigatebirds nesting on *Scaevola taccada* bushes, Middle Island; 7, hippoboscid flies on young frigatebird, Middle Island.

- 1 Marine
- 2 Beach
- 3 Shrubs
- 4 Grasses, herbs and creepers
- 5 Fresh water
- 6 Under logs and stones
- 7 Subterranean
- 8 Dead animals
- 9 Live animals and nests
- 10 Predators and parasites
- 11 Introduced species

RESULTS AND DISCUSSION

1 Marine

There are few insects adapted to the marine environment. At Ashmore Reef, marine insects are represented only by a few species of water striders (Hemiptera: Gerridae). In northern Australia several species of *Halobates* occur, occupying a variety of niches from low to high salinity and including estuary, mangrove, intertidal reef flat, lagoon and open ocean habitats. However, they can be difficult to find unless present in high numbers.

Although specimens were not specifically searched for away from land during this visit, *H. princeps* White has been recorded from the reef (as *H. ashmorensis* Malipatil) by Malipatil (1988), and *H. germanus* White recorded by Andersen and Weir (1994).

2 Beach

Beach insects were rare. This is probably due to the small amount of organic material washed up onto the beach, and to competition from the comparatively larger and very abundant hermit crabs and amphipods. The former also ranged into vegetated parts of the islands.

The only insects found in (or associated with) this zone were flies. An unidentified canacid (Diptera: Canacidae) was collected on all three islands at the high tide mark. It was common and occurred in numbers of 50 or more on the two occasions it was collected. On West Island it was associated with seaweed.

At the vegetation line on West Island, a pale ephydrid (Diptera: Ephydriidae) was common. This species appears to be attracted to light coloured objects and alighted on skin, pale cloth and orange peel, just as readily as it landed on sand. It was not observed in the open or further into the vegetated areas of the island, although it may occur in these areas. Flies of this family are often found near fresh or salt water. Larval habits for this family are diverse, and larvae may be aquatic or live within stems or plant shoots feeding on sap or other plant materials. Some species have been recorded feeding on single-celled algae.

One specimen of *Lispe* sp. (Muscidae) was collected at light on the *Aurelia IV* at anchor in the lagoon. The larvae of *Lispe* occur near fresh or salt water, and are probably predatory. Adults may be common near such areas as beach and river sand flats, but none were found in this situation or near the well during the visit.

Table 1. Caterpillar host plants (based on Australian mainland records)

Family	Caterpillar	Plant Hosts
Arctiidae	<i>Argina astrea</i> (Drury)	Crotalaria leaves (younger) and seed pods (older larvae)
	<i>Utethesia</i> spp.	<i>Argusia argentea</i> leaves
Ethmiidae	<i>Ethmia</i> spp.	Mostly feed on Boraginaceae
Lycaenidae	<i>Catochrysops panormus platissa</i> (Herrich-Schaffer)	Young shoots and flower buds of Fabaceae
	<i>Zizeeria karsandra</i> (Moore)	Flowers and young fruit of <i>Tribulus</i> and possibly Fabaceae
Noctuidae	<i>Achaea janata</i> (Linnaeus)	Polyphagous
	<i>Agrotis ipsilon aneituma</i> (Walker)	Polyphagus
	<i>Ean's smaragdina</i> Butler	Mostly Malvaceae
	<i>Helicoverpa</i> spp.	Polyphagus
	<i>Mythimna</i> spp.	Poaceae
	<i>Othreis materna</i> (Linnaeus)	Menispermaceae
	<i>Proteuxoa</i> spp.	Poaceae
	<i>Spodoptera litura</i> (Fabricius)	Polyphagous
	<i>Spodoptera mauritia</i> (Boisduval)	Poaceae
Nymphalidae	<i>Acraea andromacha andromacha</i> (Fabricius)	Passifloraceae
	<i>Danaus chrysippus petilia</i> (Stoll)	Asclepiadaceae
	<i>Hypolimnas bolina nerina</i> (Fabricius)	<i>Alternanthera denticulata</i> (Amaranthaceae) and <i>Sida rhobifolia</i> (Malvaceae) but also recorded from Acanthaceae, Portulacaceae, Polygonaceae, Rubiaceae and Asteraceae
Pieridae	<i>Eurema hecabe phoebus</i> Butler	Euphorbiace, Acacia, Fabaceae, Caesalpiniaceae
Pyralidae	<i>Diaphania indica</i> (Guenée)	Cucurbitaceae
	<i>Spoladea recurvalis</i> (Fabricius)	Chenopodiaceae, Amaranthaceae and Aizoaceae
	<i>Maruca vitrata</i> (Fabricius)	Legume seeds*
Sphingidae	<i>Agrius convolvuli</i> (Linnaeus)	Convolvulaceae
	<i>Cephonodes kingii</i> (W.S. Macleay)	Rubiaceae
	<i>Hippotion celerio</i> (Linnaeus)	Polyphagus

The flesh fly *Heteronychia australis* Johnson and Tiegs (Diptera: Sarcophagidae) occurred on all the islands and was readily attracted to meat. This species is widespread in Australia, including Lord Howe Island, as well as New Caledonia and Samoa. It has been reared from dead snails and dead grasshoppers, and like most species of the family, is a carrion feeder. It was collected from seaweed washed up on the beach, and from the Malaise trap.

3 Shrubs

Shrubs, particularly octopus bush, *Argusia argentea*, are the tallest plants on the islands (apart from a few introduced coconut trees). Shrubs predominate particularly on the margins of West Island and provide higher resting places, and shelter from the sun and wind. This shelter applies both to within the canopy of individual shrubs and to the adjacent ground cover. Consequently it is not always possible to easily distinguish between "Shrub" and "Grasses, herbs and creepers" habitats (as discussed in the following section). For example, the three small species of blattellid cockroach (Blattodea: Blattellidae) were all collected on or near *Argusia* bushes and may simply rest in shrubs during the day. Similarly, in most cases, it was not possible to determine which moths were associated with shrubs (as larval or adult food plants), and which were simply resting in nearby taller plants. Table 1 is a summary of plant host records based on Australian mainland records (Common and Waterhouse 1981; Common 1990) for the caterpillars of species of moths and butterflies recorded from Ashmore Reef. It may give an indication to lepidopteran host plants on Ashmore.

Most insects associated with shrubs were collected from octopus bush. These included the green pentatomid tentatively identified as near *Plautia* sp. (Hemiptera: Pentatomidae), the large green katydid *Polichne* sp. (Orthoptera: Tettigoniidae) and the larvae of the arctiid moth *Utethesia* sp(p). (Lepidoptera: Arctiidae). The pentatomid is a sap feeder and both adults and nymphs were present in May 1995. The katydid was found in no other habitats other than being attracted to lights. It probably feeds on the foliage of octopus bush (although some tettigoniids are also predatory). The caterpillars of *Utethesia* spp. (Lepidoptera: Arctiidae) were common and were observed feeding on the leaves of octopus bush.

Shrubs also provided a suitable substrate for web spinning spiders, particularly those of the family Araneidae, and *Paratrechina* ants (Hymenoptera: Formicidae) which were conspicuous foraging on the trunks and leaves.

There was no evidence of borers in dead octopus bush, or of termites.

4 Grasses, herbs and creepers

The ground cover of the islands varied from about ankle height where the substrate was very rocky and hard, to or above knee height in other places and included grasses and a mixture of herbaceous plants including *Ipomoea*. Collecting on grass between the octopus bushes tended to be more productive as this habitat also provided some protection from wind and sun than more open grassy areas. It was particularly productive for groups such as dragonflies and butterflies, although the damselfly *Ischnura aurora* (Brauer) (Odonata: Coenagrionidae) was collected from longer grass near the concrete slab. It was also often difficult to determine if an insect was actually associated with grass, herbs, or adjacent shrubs. Bugs, leafhoppers, moths, grasshoppers and crickets were common in this habitat.

A small white geometrid moth, *Anisodes ?obrinaria* (Guenée) (Lepidoptera: Geometridae), appeared to be associated with the white flowering *Ipomoea*, although no larvae were found. There was also evidence of leaf mining in the leaves of this plant, but no larvae or pupae were found and the mining was probably caused by a lepidopteran, but not a geometrid.

The small pterophorids (Lepidoptera: Pterophoridae) appeared to be associated with the pink flowering vine (possibly *Boerhavia repens*), especially near octopus bush, or where partially protected. The moth did not seem to occur in the open amongst the grass.

Most grasshoppers and crickets are plant feeders, particularly on grasses, although the nymphs of *Oecanthus rufescens* Serville (Orthoptera: Gryllidae) may also be predatory on other insects, while the gryllid tentatively identified as *Trigonidopmopha* or *Metioche* sp. (Orthoptera: Gryllidae) are most frequently found on the leaves of other plants. Neither the taxonomy nor the biology is well known for the Australian fauna, but *Pycnostictus seriatus* Saussure (Orthoptera: Arcididae) at least is widespread in Australia and occurs in Timor, while *O. rufescens* occurs as far west as India. *Teleogryllus oceanicus* (Le Guillou) (Orthoptera: Gryllidae) is widespread in northern Australia and extends throughout Oceania as far east as Hawaii. It normally lives near permanent water, but as both specimens were collected on board the *Aurelia IV* it was probably associated with fresh vegetables brought on board the boat. It is not directly recorded from Ashmore Reef although it may occur (D. Pike, pers. comm.), and its presence on the boat indicates the relative ease with which new species could be introduced.

The green lacewing, *Chrysopa ramburi* Schneider (Neuroptera: Chrysopidae) is a widespread species which occurs from Malaysia to Samoa, and throughout Australia. It is a slow flier, and was collected by sweeping between *Argusia* bushes. Adults also are readily attracted to lights, while nymphs are predatory on small insects.

Agromyzid larvae (Diptera: Agromyzidae) are leaf miners or gall formers in plants (probably not grasses), although no mines or galls were found during surveys.

A number of other flies are associated with the decay and decomposition of plants. These include those of the families Drosophilidae (especially fermenting material), Otitidae and Stratiomyidae. The large, diverse and poorly studied Chloropidae also contains some species that are associated with decaying plant material, although many other species are associated with or are parasites insects and other animals.

The webspinner genus *Aposthonia* (Embiopoda: Oligotomidae) is widespread in both Australia and tropical Asia. These small insects live in small silken galleries and feed on plant material including bark, leaves and lichen. Adult males are attracted to light.

The lady beetle, *Coccinella transversalis* Fabricius (Coleoptera: Coccinellidae), is predatory on other small invertebrates, while the chrysomelid (Coleoptera: Chrysomelidae) previously identified as "*Cheilonemes sexstipulata*" is a leaf feeder.

Most of the Hemiptera are plant-feeders, sucking sap from various plants including grasses. Some may be quite plant specific while others such as the mirid bug *Creontiades dilutus* (Stål) (Hemiptera: Miridae) are polyphagous. Polyphagous species are more likely to become established on Ashmore. The leafhopper fauna is particularly diverse with at least five species including the widespread and very variable *Orosius argentata* (Evans).

Millipedes (Diplopoda) are associated with decaying plant material, and are probably not dependant on any single plant species.

5 Fresh water

No insects were found directly associated with fresh water, which usually occurs year round on West Island except at the end of the dry season. However, five species of damselfly and dragonfly were collected at various locations, though not specifically near fresh water. All five are widespread Indo-Pacific species. Most of the dragonflies (Aeshnidae and Libellulidae) are strong fliers and probably migratory, although they would be capable of reproducing if permanent water was available for sufficient time. The damselfly (Coenagrionidae) is small and a weak flier and may have established on West Island.

There are a number of other species of damselfly and dragonfly (for example *Orthetrum*) with similar distribution patterns and could occur but were not evident (as adults) during my visit in May.

No mosquitoes were evident, although there is a risk that they may become established, at least temporarily, if brought to the island by Indonesian fishermen as breeding populations in bilge water. This could pose a quarantine risk.

6 Under rocks and logs

Very little was found in this habitat. Both the adult and larval stages of carab beetles (Coleoptera: Carabidae) are predatory on other invertebrates, and may also occur in the soil. Adults are often attracted to lights, although none have been recorded as doing so on Ashmore.

A number of spiders were found on the ground and under rocks. These are also predatory, and include such groups as lycosids and gnaphosids.

7 Subterranean

The larvae of several species are subterranean and feed on plant roots. These include the elaterids (Coleoptera: Elateridae), *Gonocephalum* (Coleoptera: Tenebrionidae), scarabs (Coleoptera: Scarabaeidae), and an unknown beetle (which has spiny scarab-like legs adapted for digging).

Solenopsis geminata (Jerdon) ants (Hymenoptera: Formicidae) were found nesting in the ground, as well as on drier dead turtles, and flotsam and jetsam where it reached the vegetation.

8 Dead animals

Large fleshflies, possibly *Parasarcophaga* sp. (Diptera: Sarcophagidae) were commonly attracted to dead animals and meat. They are likely to be one of the first insects attracted to dead animals and were associated with dead turtles and dead molluscs on West Island. These flies also came readily to meat and dead fish on *Aurelia IV*. They were common and widespread.

Other carrion feeders include milichiids (Diptera: Milichiidae), and possibly phorids. Large, patterned flies were observed and tentatively identified in the field as phorids, but

none were caught, and it is also possible that they were also a milichiid species. The carrion feeding ants (Hymenoptera: Formicidae), *Paratrechina longipes* (Latrielle) and *Solenopsis geminata* were observed but not collected in this habitat. Beetles were represented by *Dermestes ater* De Geer (Coleoptera: Dermestidae) and *Necrobia rufipes* (De Geer) (Coleoptera: Cleridae). These beetles are attracted to long dry carcasses.

9 Live animals (birds) and nests

The pantropical *Olfersia spinifera* (Leach) (Diptera: Hippoboscidae) was common on frigatebird chicks, and also common around bushes on which lesser and greater frigatebirds were nesting. (Flies also commonly landed on humans in the vicinity but did not bite.)

Musca vetustissima Walker (Diptera: Muscidae) is rare on West Island but common on East and Middle Islands. The preferred larval habitat is fresh mammal dung, but it has also been recorded from emu dung and carrion on the Australian mainland (Pont, 1973). The absence of terrestrial mammals and the relative abundance of this species on East and Middle Islands, where bird colonies are large, suggests that this species is breeding in bird dung, and may also feed on dead birds and turtles.

Most aphodinine scarabs (Coleoptera: Scarabaeidae) are dung feeders, but some are associated with the nests of animals. In the absence of mammals, the scarab tentatively identified as *Trichiorhyssemus hirsutus* Cloët may be associated with nesting birds or their droppings. This species is recorded also from Cocos-Keeling Islands.

The tineid moth, *Monopsis* sp. (Lepidoptera: Tineidae), may also be associated with nesting birds. Larvae have been recorded in Australia feeding on feathers, animal fibres and bird droppings (Common, 1990).

No search was made for bird ectoparasites other than the large and conspicuous *O. spinifera*, or for insects associated with bird nests.

10 Predators and parasites

The main predatory groups on the islands are: the dragonflies and damselflies (Odonata) (including nymphs if established species); mantids (Mantodea) (if established); Neuroptera; Arachnida; and Chilopoda. Some beetles (Coleoptera) such as carabs (Carabidae) and coccinellids (Coccinellidae) are also predatory, as is the pentatomid, *Oechalia schellenbergii* (Guérin) (Hemiptera: Pentatomidae). The latter, however, is an atypical species of this predominantly phytophagous family of true bugs and is predatory on a wide variety of insects and spiders.

All arachnids and centipedes are predatory. Some of the spiders such as the araneids produce typical webs while others such as theridiids produce only a few strands; and others such as lycosids (Arachnida: Lycosidae) are free-ranging ground dwelling species. The pseudoscorpions were observed at the top of the sandy beach on West Island, and may have been associated with the *Solenopsis* ants (Hymenoptera: Formicidae).

All of the Hymenoptera are parasites of insects and spiders, with the exception of the ants which are scavengers. Pompilids (Pompilidae) are parasitic on spiders; *Scelio* spp. (Scelionidae) on acridid grasshopper eggs (Orthoptera: Acrididae); evaniids (Evaniidae) on cockroach eggs (Blattodea); and *Cotesia* sp. (Braconidae) on lepidopteran larvae. Other groups are parasitic on a variety of insect groups: bethylids (Bethyidae) on Coleoptera or

Lepidoptera; encyrtids (Encyrtidae) on Lepidoptera or Hemiptera; eupelmids (Eupelmidae) possibly on Lepidoptera eggs; braconids (Braconidae) and ichneumonids (Ichneumonidae) on a variety of insects; and eulophids (Eulophidae) on a variety of insect eggs.

Tachinid flies (Diptera: Tachinidae) as a group are also parasitic on a wide variety of insects. Three unidentified species were collected and are most likely to be parasites of beetle or moth larvae. Identification of this group is difficult.

11 Introduced species

Several cosmopolitan species of beetle have almost certainly been introduced to Ashmore through the presence of humans. These include *Araecerus coffeae* (Fabricius) (Coleoptera: Anthribidae), *Alphitobius laevigatus* (Fabricius) (Coleoptera: Tenebrionidae), *Necrobia rufipes* (Coleoptera: Cleridae) and *Dermestes ater* (Coleoptera: Dermestidae). All are common stored-product pests: the former two species preferring plant materials such as dry seeds, while the latter two prefer animal tissue such as dried meat, and were found on decomposing and dehydrated vertebrate remain.

The two species of ants, *Solenopsis geminata* and *Paratrechina longipes* (Hymenoptera: Formicidae), are introduced "tramp" species that occur in many of the warmer parts of the world. They feed on a variety of animal products. The former is a very aggressive species, capable of infesting nests and attacking both young and adult birds.

The widespread Australian species *Creontiades dilutus* (Hemiptera: Miridae) is tentatively identified from the islands, and is possibly introduced.

The presence of the moth *Amata* sp. (Lepidoptera: Arctiidae) on the patrol boat travelling to Ashmore Reef, and the presence of the stored-product moths *Ephestia* sp. and *Plodia interpunctella* (Lepidoptera: Pyralidae) and the cricket *Teleogryllus oceanicus* (Le Guillou) (Orthoptera: Gryllidae) on the *Aurelia IV* indicate how easy it is to introduce new species to the islands.

Also of concern from the entomological view is the occurrence of the Asian House Gecko, *Hemidactylus frenatus* Duméril and Bibron (Reptilia: Gekkonidae) which was observed in the Malaise trap. If this lizard is established on West Island, as it appears to be, then this is likely to have a significant effect on the insects already established on at least West Island. It is also likely to impact on establishment of newly arrived species.

DISCUSSION

This report is based on a field trip to Ashmore Reef in May 1995 as well as material collected over a longer period by Des Pike. A preliminary list of insects was given by Pike (1992), and all of this material was re-examined for this report except the following:

Mantodea

unknown ootheca

Coleoptera: Chrysomelidae

Cheilonemes sexustipulata

Lepidoptera: Noctuidae

Helicoverpa (= *Heliothis*) sp. A

Othreis materna (Linnaeus)

Lepidoptera: Sphingidae

Cephonodes kingii (W.S. Macleay)

Hymenoptera: Evaniidae

Evania sp.

In addition, the identifications of several species have been changed from those given in Pike's (1992) preliminary list. These species have been annotated and cross referenced accordingly (Appendix 1).

The recorded insect fauna is relatively small, with 6 dragonflies and damselflies (Odonata); 3 cockroaches (Blattodea); 1 mantid (Mantodea); 8 grasshoppers and crickets (Orthoptera); 16 bugs and leafhoppers (Hemiptera); 1 lacewing (Neuroptera); 1 webspinner (Embioptera); 11 beetles (Coleoptera); 21 flies (Diptera); 45 moths and butterflies (Lepidoptera); and 14 ants and wasps (Hymenoptera). This is a total of 127 species of insect. Also recorded are 7 species of spider (Arachnida), and single species each of centipede (Chilopoda), pseudoscorpion (Pseudoscorpiones) and millipede (Diplopoda). It is not known which species are seasonal or permanently established on Ashmore Reef.

Most species were collected on West Island due to its accessibility. Most species collected on East or Middle Islands were also on West Island. However, there were at least 11 species of moth that were not found on West Island. This is a surprising since many moths are strong fliers. The anomaly difference may be due to different collecting methods, or collecting effort, or it may reflect apparent dispersion patterns.

A number of species are widely distributed in Asia and Australia and may have been amongst the first species to arrive on the islands. Examples included many moths such as *Argina astrea*, *Achaea janata* *Spodoptera litura* and *Spoladea recuralis* (Fabricius), and some dragonflies such as *Pantala flavescens* and *Trapezostigma loewi*. Species will not become established on Ashmore in the absence suitable habitats and will only persist while suitable habitat exists. Many species are likely to arrive on Ashmore in large numbers as seasonal migrants, or singly as accidental visitors, and may not establish permanent resident populations. Examples include seasonal migrating dragonflies (*Pantala flavescens* and *Trapezostigma loewi*) and accidental visitors such the nymphalid butterflies (*Acraea andromacha* (Fabricius) and *Danaus chrysippus petilia* (Stoll)). The only known hosts of these two species of butterfly belong to the plant families Passifloraceae and Asclepiadaceae respectively. Neither plant family is represented on Ashmore, but despite this, the specimens of *A. andromacha* caught were in almost perfect condition.

Some species, including the stored product beetles *Araecerus coffeae*, *Alphitobius laevigatus*, *Necrobia rufipes* and *Dermestes ater*, the ants *Solenopsis geminata* and *Paratrechina longipes* (and the Asian House Gecko, *Hemidactylus frenatus*) are clearly introduced. The presence of the stored product pyralid moths *Ephestia* sp. and *Plodia interpunctella*, and the black cricket *Teleogryllus oceanicus* (Le Guillou) on the *Aurelia IV* demonstrates how easy it would be for new species to be accidentally introduced to the islands. There is also the potential for exotic mosquitoes to become established at least

temporarily. Any such diseases that these mosquitoes carry could easily be spread to humans and brought back to the Australian mainland by visiting vessels.

From a conservation management point of view there are concerns over the presence of the ant *Solenopsis geminata* and it is recommended that this aggressive species be controlled before it becomes too widespread, and before it has a significant effect on nesting birds.

The distribution and impact of the Asian House Gecko, *Hemidactylus frenatus*, also warrants further study.

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REFERENCES

- Andersen, N.M. and Weir, T.A. 1994. The sea skaters, genus *Halobates* Eschscholtz (Hemiptera: Gerridae), of Australia: taxonomy, phylogeny and zoogeography. *Invertebrate Taxonomy* 8: 861-909.
- Common, I.F.B. 1990. *Moths of Australia*. Melbourne University Press, Carlton. 535 pp.
- Common, I.F.B. and Waterhouse, D.F. 1981. *Butterflies of Australia*. Angus and Robertson, Sydney. 682 pp.
- Malipatil, M.B. 1988. Two new species of *Halobates* Eschscholtz (Hemiptera: Gerridae) from Australia. *Journal of the Australian Entomological Society* 27: 134-138.
- Pike, D. 1992. Collecting insects in the Ashmore Reef Nature Reserve. ANPWS, Ashmore Patrol Report No.1: pp.46-55.
- Pike, G.D. and Leach, G.J. 1997. *Handbook of the vascular plants of Ashmore and Cartier Islands*. Parks and Wildlife Commission of the Northern Territory and Parks Australia, Darwin, 156 pp.
- Pont, A.C. (1973). Studies on Australian Muscidae (Diptera). IV. A revision of the subfamilies Muscinae and Stomoxyinae. *Australian Journal of Zoology. Supplementary Series* 21: 129-296.

APPENDIX 1 CHECKLIST OF INSECTS, ARACHNIDS, CHILOPODS & DIPLOPODS RECORDED FROM ASHMORE REEF

(tentative or unconfirmed identifications are marked with “?”)

CLASS INSECTA

ORDER ODONATA (dragonflies and damselflies)

Aeshnidae

Anax guttatus (Burmeister) [previously identified as *Hemianax ?papuensis* (Burmeister)]

East I.: iii-iv.1992

West I.: iv.1992

Coenagrionidae

Ischnura aurora (Brauer)

West I.: 10.v.1995

Libellulidae

Diplacodes bipunctata (Brauer)

West I.: 11.v.1995

Diplacodes trivialis (Rambur)

West I.: unconfirmed observations v.1995

Pantala flavescens (Fabricius)

West: iv.1992, 9.v.1995

Trapezostigma loewi (Kaup)

West I.: 9.v.1995, 12.v.1995

ORDER BLATTODEA (cockroaches)

Blattellidae

unknown sp. A

West I.: 10-14.iii.1992; 10-17.v.1995 ex malaise trap

unknown sp. B

West I.: iii-iv.1992; 9-17.v.1995 ex malaise trap, ex *Argusia argentea* bushes and sweeping grass between *Argusia argentea* bushes

unknown sp. C

West I.: 9.v.1995 ex sweeping grass between *Argusia argentea* bushes

ORDER MANTODEA (mantids)

Mantidae

unknown [previously identified as possibly *Archimantis* sp.]

West I.: ootheca [not retained in collection]

ORDER ORTHOPTERA (grasshoppers and crickets)

Acrididae

?*Aiolopus* sp.

West I.: iv.1992; 10.v.1995 sweeping grass between *Argusia argentea* bushes; 11-12.v.1995 on *Argusia argentea* bushes

Goniaea sp.

West I.: iii-iv.1992 (nymph)

Pycnostictus seriatus Saussure [previously identified as 3 species]

Middle I.: 10-14.iii.1992

West I.: iv.1992, 10-18.iii.1992, 9-10.v.1995 sweeping grass between *Argusia argentea* bushes

Gryllidae

Oecanthus rufescens Serville [males and females identified as separate species previously]

West I.: iv.1992

Teleogryllus oceanicus (Le Guillou)

Aurelia IV, West I. lagoon: 14.v.1995 in doors on boat

Trigonidopmorpha \ *Metioche* sp.

West I.: 12.v.1995, 10-17.v.1995 malaise trap

Tettigoniidae

Conocephalus sp.

West I.: iii-iv.1992; 9.v.1995 sweeping grass between *Argusia argentea* bushes, adults and nymphs

Polichne sp.

West I.: iv.1992, 10.v.1995 sweeping grass between *Argusia argentea* bushes, 12.v.1995 at light

ORDER HEMIPTERA (leafhoppers, bugs)

Cicadellidae

Orosius argentatus (Evans)

West I.: iii-iv.1992, 10-17.v.1995, 10.v.1995 on boat

Agalliinae

unknown sp. A

Middle I.: iii-iv.1992

West I.: iii-iv.1992, 9.v.1995, 10-17.v.1995

Deltocephalinae

unknown sp. B

Middle I.: iii-iv.1992

West I.: iii-iv.1992, 10.v.1995, 11.v.1995, 16.v.1995, 10-17.v.1995

Cicadellidae

unknown sp. C

West I.: 10-17.v.1995, Malaise trap

Delphacidae

unknown sp. A [most collected on boat at light, also one in Malaise trap, many caught]

West I.: 10.v.1995, 11.v.1995 at light on *Aurelia* IV, 10-17.v.1995 Malaise trap

Gerridae

Andersen and Weir (1994) record the following two species from the boat anchorage (off West Island).

Halobates germanus White

Halobates princeps White (= *H. ashmorensis* Malipatil)

Lygaeidae

Nysius sp.

West I.: iv.1992, 12.v.1995

Oxycarenus sp. West [may be associated with white *Ipomoea*, although one on dead turtle]

West I.: 12.v.1995, 12-15.v.1995, on dead turtle

Pseudopachybrachius sp. [mostly at light]

West I.: 12-17.v.1995 at light, 12.v.1995

Geocorinae sp. A

West I.: 12.v.1995

Miridae

?*Creontiades dilutus* (Stål)

Middle I.: iii-iv.1992

nr *Campylomma* sp.

West I.: iv.1992, 16.v.1995

Nabidae

unknown sp. A [common]

West I.: 9.v.1995 sweeping grass between *Argusia argentea*, 10-12.v.1995 at light, 10-17.v.1995 Malaise trap

Pentatomidae

Oechalia schellenbergii (Guérin)

West I.: iii-iv.1992

nr *Plautia* sp. West [both adults and nymphs feeding on octopus bush]

West I.: 11.v.1995 on *Argusia argentea*

ORDER NEUROPTERA (lacewings)

Chrysopidae

Chrysopa ramburi Schneider

West I.: iii-iv.1992; 9.v.1995, 12.v.1995, sweeping between *Argusia argentea* bushes

ORDER EMBIOPTERA (webspinners)

Oligotomidae

?*Aposthonia* sp. [previously identified as unknown sp. A and B]

East I.: iv.1992

Middle I.: iii-iv.1992

West I.: 12-15.v.1995 at light; 10.v.1995 ex Malaise trap

ORDER COLEOPTERA (beetles, weevils)

Anthicidae

unknown sp. A

West I.: 10-17.v.1995 ex Malaise trap

Anthribidae

?*Araecerus coffeae* (Fabricius) [larvae will feed in mature seeds and fungal affected plant tissue]

West I.: 10-17.v.1995, Malaise trap; 15.v.1995 on rotten banana.

Carabidae

nr *Hypharpax* sp. [previously identified as *Gnathophanus* sp. A]

West I.: 10-14.iii.1992

Chrysomelidae

?*Cheilonemes sexustipulata*

previously recorded from Middle Island, but specimens not seen.

Cleridae

Necrobia rufipes (De Geer) [very variable in size, previously recorded as two species]

West I.: iii-iv.1992; 12-15.v.1995 on dead turtle

Coccinellidae

Coccinella transversalis Fabricius [formerly *C. repanda*]

East I.: iv.1992 (larva)

Middle I.: iii.iv.1992

West I.: 12.v.1995 at light; 9.iv.1995 sweeping grass between *Argusia argentea* bushes; 10-17.v.1995 malaise trap

Dermestidae

Dermestes ater De Geer

Middle I.: iii-iv.1992; 16.v.1995 on dead reef heron (*Egretta saera* (Gmelin))

Elatерidae

?*Conoderus* sp. A

Middle I.: iii-iv.1992

West I.: iii.1992; 9.v.1995, by sweeping between *Argusia argentea* bushes; 12.v.1995

Scarabaeidae

?*Trichiorhyssemus hirsutus* Clouët

Middle I.: iii-iv.1992

West I.: iii.1992

Tenebrionidae

Alphitobius laevigatus (Fabricius) [previously identified as *Aphodius* sp. B]

West I.: iii.1992

Gonocephalum sp.

West I.: iii-iv.1992; 18.v.1995

Unknown Coleoptera [previously identified as Hydrophilidae, Sphaeridinae]

unknown sp. A

Middle I.: iii-iv.1992

West I.: iii.1992

ORDER DIPTERA (flies, mosquitoes)

Agromyzidae

unknown sp. A

West I.: 15.v.1995 ex Malaise trap

Canacidae [previously identified as Chloropidae]

unknown sp. A

East I.: 14.v.1995 at high tide mark

Middle I.: iii-iv.1992

West I.: 15.v.1995 on seaweed at high tide mark

Chloropidae

unknown sp. A

West I.: iii.1992

unknown sp. B

Middle I.: iii-iv.1992

Drosophilidae

?*Drosophila* sp. A

West I.: iii.1992

?*Drosophila* sp. B

East I.: iv.1992

Ephydriidae

Hecamede complex

West I.: 17.v.1995

Hippoboscidae

Olfersia spinifera (Leach)

East I.: iii-iv.1992

Middle I.: 16.v.1995, ex frigatebird (*Fregata minor* (Gmelin) colony)

Ashmore Reef (no Island indicated): v.1987 ex frigatebird (*Fregata minor*) colony

Milichiidae

unknown sp. A [formerly identified as Chloropidae sp. B]

West I.: iii-iv.1992; 15.v.1995 ex dead turtle on beach

Muscidae

Lispe sp. A

West I.: 8.v.1995

Musca vetustissima Walker

East I.: iii-iv.1992

West I.: 10-14-iii.1992

Otitidae

Acrosticta sp. A

West I.: 12.v.1995

Phoridae

[observed on dead turtles on West Island, but not collected (possibly misidentified milichiid)]

Sarcophagidae

Heteronychia australis Johnston and Tiegs

West I.: 10-17.v.1995 ex Malaise trap; 15.v.1995 on kelp at high tide mark

?*Parasarcophaga* sp.

West I.: iii-iv.1992; 8-10.v.1995, by sweeping between *Argusia argentea* bushes, attracted to thawing meat on *Aurelia IV* anchored in the lagoon

unknown sp. A

Middle I.: 16.v.1995

Stratiomyidae [previously identified as Syrphidae]

unknown sp. A

West I.: iii.1992

Tachinidae

unknown sp. A

West I.: ii.1992

unknown sp. B

West I.: ii.1992

unknown sp. C

West I.: 10-17.v.1995 ex Malaise trap

Unknown Acalyptrata

unknown sp. A.

East I.: iv.1992 [previously identified as unknown Muscidae]

ORDER LEPIDOPTERA (moths and butterflies)

Arctiidae

Amata sp.

HMAS Wollongong: 7.v.1995, at light 12°15'S, 126°33'E

Argina astrea (Drury)

West I.: 18.v.1995

Utethesia sp(p). [widespread, common, feed on *Argusia argentea* (undetermined larva previously collected from East Island may be this species)]

Middle I.: 10-14.iii.1992

West I.: 10-14.iii.1992, 9.v.1995, 16.v.1995

Ethmiidae

Ethmia sp.

West I.: 16.v.1995 at light

Gelechioidea

unknown sp. A

Middle I.: iii-iv.1992

unknown sp. B

Middle I.: iii-iv.1992

unknown sp. C

Middle I.: iii-iv.1992

unknown sp. D

West I.: iii-iv.1992

Geometridae

Anisodes ?obrinaria (Guenée) [previously identified as *Acontiinae* sp. F]

East I.: iii-iv.1992

West I.: 10-14.iii.1992; on *Aurelia* IV 10.v.1995 at light; 11.v.1995 on *Argusia argentea*; 14.v.1995 at light;

Lycaenidae

Catochrysops panormus platissa (Herrich-Schaffer) [western end of West Island only]

West. I.: 9.v.1995, 10.v.1995 sweeping between *Argusia argentea* bushes

Zizeeria karsandra (Moore)

East I.: iii-iv.1992

Noctuidae

Achaea janata (Linnaeus)

East I.: iv.1992

West I.: 10-14.iii.1992; 9.v.1995 at light on boat

Acontiinae

unknown sp. C:

East I.: iii-iv.1992

unknown sp. D:

East I.: iii-iv.1992

unknown sp. G:

West I.: 10-14.iii.1992

Agrotis ipsilon aneituma (Walker) [previously identified as *A. munda* Walker]

West I.: 10-14.iii.1992

?*Athetis* sp. (= *Radingoes*) [previously identified as Acontiinae sp. B]

East I.: iii-iv.1992

Earis smaragdina Butler N. [previously identified as Acontiinae sp. A]

East I.: iii-iv.1992

West I. 10-14.iii.1992, iii-iv.1992, 10.v.1995 sweeping grass between *Argusia argentea* bushes; 10-17.v.1995 malaise trap

Helicoverpa sp. A

recorded previously from East, Middle and West Islands but specimens not seen

Mythimna sp. [in good condition]

West I.: 16.v.1995 at light

Othreis materna (Linnaeus)

recorded previously from West Island but specimen not seen

Proteuxoa sp

West I.: 9.v.1995 and 14.v.1995 on *Aurelia IV*

Spodoptera litura (Fabricius) [previously identified as *Agrotis munda* Walker]

East I.: iii-iv.1992

Middle I.: 10-14.iii.1992

West I.: 10-14.iii.1992, iv.1992, 10.iii.1995 at light (perfect condition), 14.v.1995, 18.iv.1995

Spodoptera mauritia (Boisduval)

West I.: 13.v.1995 at light on *Aurelia 4* in good condition, female.

unknown sp. A

Middle I.: 10-14.iii.1992

Nymphalidae

Acraea andromacha andromacha (Fabricius) [newly emerged, 1 of 2 collected]

West I.: 15.v.1995

Danaus chrysippus petilia (Stoll)

West I.: 12.v.1995 rare

Hypolimnys bolina nerina (Fabricius) [very battered]

West I.: 9.v.1995

?Oecophoridae

unknown sp. A

West I.: iv.1992

Pieridae

Eurema hecabe phoebus Butler

West I.: 9.v.1995

Pterophoridae

unknown [common on herbs]

West I.: iii.1992; iv.1992; 9.v.1995 and 11.v.1995 sweeping between *Argusia argentea* bushes; 15.v.1995

Pyralidae

Diaphania indica (Saunders)

West I.: 9.v.1995 on boat, 11.v.1995 on *Argusia argentea*

Ephestia sp.

West I.: 14.v.1995 on *Aurelia IV*, 15.v.1995 at light

Maruca testulalis (Geyer)

West I.: 9.v.1995, also on *Aurelia IV*, 14.v.1995, 16.v.1995 on *Aurelia IV*

Plodia interpunctella (Hübner)

West I.: 16.v.1995 on *Aurelia IV* in pantry

?Pyraustinae

unknown sp. A [includes unknown sp. B]

West I.: 10-14.iii.1992

unknown sp. C

West I.: 10-14.iii.1992

unknown sp. D [some previously misidentified as sp. E]

East I.: iii-iv.1992

unknown sp. E

East I.: iii-iv.1992

?Schoenobiinae

unknown sp. A

West I.: 10-14.iii.1992

Spoladea recurvalis [= *Hymenia fasciatus* (Fabricius)]

East I.: iii-iv.1992

Middle I.: 16.v.1995

West I.: 10-14.iii.1992; 10.v.1995 sweeping between *Argusia argentea* bushes, 10-17.v.1995 Malaise trap, 15.v.1995; 16.v.1995 on *Aurelia IV*

Pyalidae

unknown sp. A

West I.: at light on boat 9.v.1995, 10.v.1995, 16.v.1995

unknown sp. B

West I.: 16.v.1995 at light

unknown sp. C [also observed on East I.]

Middle I.: 16.v.1995

unknown sp. D

Middle I.: 16.v.1995

Sphingidae

Agrius convolvuli (Linnaeus)

West I.: 10-14.iv.1992, iv.1992, 17.v.1995 at light

?*Cephonodes kingii* (W.S. Macleay)

previously recorded from West Island but no specimens seen

Hippotion celerio (Linnaeus)

West I.: iv.1992

Tineidae

Monopsis sp. A

East I.: iv.1992

Middle I.: iii-iv.1992

Unknown Lepidoptera

unknown sp. A

West I.: 10-17.iii.1995 Malaise trap

unknown sp. B

West I.: 10-17.iii.1995 Malaise trap

ORDER HYMENOPTERA (ants, bees and wasps)

Bethylidae

unknown sp. A

West I.: iv.1992, 16.v.1995, 10-17.v.1995 ex Malaise trap

Braconidae

Cotesia sp.

West I.: 10-17.v.1995 ex Malaise trap

unknown sp. A

East I.: iv.1992

unknown sp. B

West I.: v.1995 ex Malaise trap

Encyrtidae

unknown sp. A

West I.: 10-17.v.1995 ex Malaise trap

Eulophidae

unknown sp. A

West I.: 10-17.v.1995 ex Malaise trap

Eupelmidae

unknown sp. A

West I.: 10-17.v.1995 ex Malaise trap

Evaniidae

Evania sp.

previously recorded from West Island, but no specimens seen

Formicidae

?*Paratrechina longipes* (Latrielle)

West I.: 12-15.v.1995

Solenopsis geminata (Jerdon) [workers and females previously identified as two species of *Cardiocondyla*]

Middle I.: iv.-v.1992

West I.: iv.1992,12-15 v.1995

Ichneumonidae

?*Pristomeris* sp. A

East I.: iv.1992

Middle I.: iv.-v.1992

Pompilidae

Anoplius opulentus Smith

West I.: 9.v.1995 and 10.v.1995 by sweeping grass between *Argusia argentea*

Scelionidae

Scelio sp.

West I.:10-17.v.1995 ex Malaise trap

Unknown microhymenoptera

unknown sp. A

West I.:10-17.v.1995 ex Malaise trap

NON-INSECTS

The following non-insects are recorded but not identified:

ARACHNIDA - ARANEAE

Araneidae

Neoscona sp

Nephila sp.

Clubionidae

Gnaphosidae

Lycosidae

Pholcidae

Theridiidae

ARACHNIDA - PSEUDOSCORPIONES

CHILOPODA - SCOLOPENDRIDA

DIPLOPODA - POLYXENIDA

